

(Scheme Effective from July 2023)

Devi Ahilya University, Indore, India Institute of Engineering & Technology			III Year B.E. (Mechanical Engg.) (Full Time)				
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
5MERG1 MACHINE DESIGN I	3	1	0	3	1	0	4
Duration of Theory Paper: 4 Hours							

### Course Objective:

The course is designed

1. To introduce the students about the concept and importance of the design (A decision making)
2. To give the concept about the theories of failures and importance of material's selection in design
3. To give the concepts about the design of basic mechanical components like springs, rotating elements etc.

**Pre requisite(s):** Theory of Machines, Strength of Materials, Material Science.

## COURSE CONTENTS

### UNIT-I

**Theory of Failures & Applications:** Theories of failure, their applications to the design problems. Design of parts subjected to torsional and/ or bending such as spiral, helical and leaf springs.

### UNIT-II

**Pressure Vessels and Cover Plates:** Analysis of thick cylindrical and spherical shells, compound cylinders, joint for steam and hydraulic pipes, parts of press fit and shrink fit, design consideration of pressure vessels and cover plates.

### UNIT-III

**Rotating Rings and Disks:** Disk of uniform thickness and disk of uniform strength. Effect of drilled hole and extra mass, design of flywheel and pulleys.

### UNIT-IV

**Design Analysis of Curved Machine Members:** Crane Hook, Chain link, open and closed links, M/c. Frames, Wall brackets.

### UNIT-V

**Experimental Methods in Design and design of wire rope:** Brief idea about experimental stress analysis techniques and their applications and limitation, design and selection of hooks and wire ropes.

**Note:** Only Mechanical Engineer's Handbook, Data-books and certified notes are allowed in the examination hall.

**Course Outcome:**

Students earned credits will develop ability to

- CO1. Have the importance, role and concept of design
- CO2. Learn to apply the knowledge of material science in real life situations.
- CO3. Design the basic machine elements like spring, cylinder etc.
- CO4. Know about the latest stress analysis techniques

**BOOKS RECOMMENDED:**

- [1]. Shingley J.E., *Mechanical Engineering Design*, McGraw-Hill 2003.
- [2]. Spotts M.F., Shoup T.E., Hornberger L.E., *Design of Machine Elements*, Pearson Education, 8e, 2006
- [3]. Sharma P.C. & Aggarwal D.K., *Machine Design*, S.K. Kataria & Sons, 11e, 2006
- [4]. Shariff A., *Design of Machine Elements*, Dhanpat Rai Publications(P) Ltd., 3e, 1995

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**Course Outcome:**

Students earned credits will develop ability to

CO.No.	CO	PO
CO1	Have the importance, role and concept of design.	PO1, PO2, PO3
CO2	Learn to apply the knowledge of material science in real life situations.	PO1, PO3, PO4, PO7
CO3	Design the basic machine elements like spring, cylinder etc.	PO1, PO3, PO4
CO4	Know about the latest stress analysis techniques.	PO1, PO4, PO5, PO12

**CO-PO Relationship**

CO	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO1	3	3	3									
CO2	3		3	3			2					
CO3	3			3	3							2
CO4	3			3	3							2
CO5												

\* CO (rows) mention nil/very small/insignificant contribution to the PO(column)

1 → relevant and small significance    2 → medium or moderate    and    3 → strong